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But it is well known that the sum of like powers of the numbers  $1, 2, 3, \dots, p - 1$  is divisible by  $p$  if the power is not a multiple of  $p - 1$ ; hence, the theorem is proved.

As a generalization of the congruence above, we may state

$$\sum_{a=1}^{a=p-1} \frac{1}{a^k} \equiv 0 \pmod{p}$$

if  $k$  is not a multiple of  $p - 1$ .

## II. SOLUTION BY THE PROPOSER.

$$\sum_{a=1}^{a=p-1} \frac{1}{a^2} \equiv \sum_{a=1}^{a=p-1} a^2 \pmod{p}.$$

But

$$\sum_{a=1}^{a=p-1} a^2 \equiv A_1^2 - 2A_2$$

where

$$A_1 = \sum_{a=1}^{p-1} a, \quad A_2 = \sum_{\substack{a_1=1 \\ a_2=1}}^{p-1} a_1 a_2, \quad a_1 \neq a_2.$$

In Bachmann's *Niedere Zahlentheorie*, Vol. I, page 155, it is proved that  $A_1$  and  $A_2$  are divisible by  $p$ , whence the theorem.

## NOTES AND NEWS.

EDITED BY W. D. CAIRNS.

Professor ANDREW W. PHILLIPS, of Yale University, died on January 20, 1915. He was joint author of Phillips and Fisher's *Geometry*.

Professor R. M. BARTON of the University of New Mexico has been appointed professor of mathematics in Lombard College.

Professor W. H. ROEVER, representative of Washington University on the editorial staff of the MONTHLY, was elected to honorary membership in the Society of Phi Beta Kappa by the Washington University Chapter, which was installed last year.

"The arithmetic mean as approximately the most probable value *a posteriori* under the gaussian probability law," by EDWARD L. DODD, is the title of a pamphlet published by the University of Texas as its January, 1915, *Bulletin*.

The February number of the *Proceedings of the National Academy of Sciences* contains two mathematical articles. The first is by Professor E. J. WILCZYNSKI and bears the title "Conjugate systems of space curves." The second is due to

Professor L. P. EISENHART and appeared under the heading "Transformation of surfaces omega."

The *American School Board Journal* for December prints an article by Mr. GEORGE H. ECKELS on "The place of mathematics in the highschool curriculum."

Professor A. O. LEUSCHNER of the University of California was elected vice-president for 1915 of Section A (Mathematics and Astronomy) of the American Association for the Advancement of Science.

The central committee of the International Commission on the Teaching of Mathematics has found it necessary to abandon the meeting planned for Munich in August of this year and to postpone the preparation of such reports as concern European countries.

Professor S. W. SHATTUCK, who until his retirement in 1912 was for thirty-seven years head of the department of mathematics in the University of Illinois, died in Champaign on February 13.

The first award of the Alfred-Ackermann-Teubner Prize, which was inaugurated in 1912 for the advancement of the mathematical sciences, has been made to Professor FELIX KLEIN for his work relating to the teaching of mathematics. The money value of this prize is 1,000 marks, and it is to be awarded every two years. The subject for 1916 is "Mathematics, primarily arithmetic and algebra."

The "List of officers and members" of the American Mathematical Society published in January shows a membership at present of 709, 38 having been admitted and 32 having withdrawn during 1914. New York State furnishes the largest group, 115 members, 70 of whom are in New York City. There are 56 members from foreign countries.

Professor de la VALLÉE POUSSIN of the University of Louvain is giving a series of lectures in French at Harvard University on Lebesgue Integrals. The lectures are given twice or three times a week during the second semester and are accompanied by supplementary lectures and explanations in English by Dr. DUNHAM JACKSON.

At the University of Illinois the graduate students in mathematics recently formed a temporary organization with a view to securing lectures on mathematical topics which are not commonly treated in the regular courses. During the present semester these lectures are being given by Professors G. A. MILLER and J. B. SHAW on the general subjects, historical development and philosophy of mathematics.

In the February number of *School Review* Mr. J. H. MINNICK of Horace Mann High School, Columbia University, reports on "A comparative study of the mathematical abilities of boys and girls," based upon the work of 150 boys and

243 girls in the Bloomington (Indiana) high school during the four years beginning September, 1906. Their relative achievements in English, history, language and science were also tabulated and certain definite conclusions were reached by the author. Taking into account the whole student body, the girls are the equals of the boys although they do not excel to the same degree in mathematics as in some other subjects, especially in language and English. Among the retarded students, mathematics has given slightly more trouble to girls than to boys; mathematics is evidently a slightly stronger factor in the elimination of girls than of boys. Measured by ability to achieve, mathematics is about as well suited to girls as are history and science.

Further, the records of 191 students who entered the high school during the years 1903-1909 and later studied in Indiana University were considered, this study indicating that while smaller percentages of girls are conditioned and failed, the girls as a group do not maintain their standing in the university quite as well as do the boys.

The annual meeting of the British Mathematical Association was held at the London Day Training College, London, on January 9, under the presidency of Sir George Greenhill. It will be of interest to our readers, by way of comparison with American associations, to know that this body now enrolls 749 members, of whom 8 are honorary and 80 are life members; aside from these there are about 200 associates. Professor A. N. Whitehead was elected president for the years 1915 and 1916.

During the past year the Council has issued a *Catalogue of Current Mathematical Journals, etc.*, with the names of the libraries in which they may be found; the work was done largely through W. J. Greenstreet, editor of the *Mathematical Gazette*, the organ of the Association.

In continuance of the important work done in the past few years, two committees may be mentioned; namely, (1) a subcommittee has been considering the whole question of the teaching of geometry and is now engaged in drawing up a report; (2) a special committee is preparing a report on the teaching of mathematics in girls' schools. The latter report is to include not only a fairly detailed scheme of work in mathematics for girls, both specialists and non-specialists, but also suggestions as to methods of teaching the subject.

Sir George Greenhill's presidential address on "Mathematics in artillery science" is reported in a summarized form in *Nature* for January 21. This address has not as yet appeared in print, but has been reported only in the daily papers; a possible explanation is his severe criticisms of England's lack of attention to the theoretical grounding of military science.

The seventeenth conference of the secondary schools cooperating with the University of Chicago was held at Chicago on Friday, April 16, 1915. The general topic for all the departmental sections was on the use of the school library. In the mathematics section this topic had already been discussed at the preceding conference and hence the meeting was devoted to the consideration of two

other topics, namely, (1) the contribution of mathematical clubs to interest and activity among high school pupils, and (2) the closer interrelations that should exist between the mathematics of the sixth, seventh, and eighth grades and the mathematics of the high school, considered from the standpoint both of efficiency in teaching and of economy in time.

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**SUBSCRIPTIONS** should be made payable to THE AMERICAN MATHEMATICAL MONTHLY, and sent to the TREASURER, B. F. FINKEL, Springfield, Missouri.

**FOREIGN AGENTS:** Z. P. Maruya & Co., Ltd., Tokyo, Japan.

A. Hermann, 8 Rue de la Sorbonne, Paris, France.

The need of a standard journal in this country, with aims such as those of the AMERICAN MATHEMATICAL MONTHLY, is attested by the fact that the subscription list has nearly trebled since the reorganization in 1912. All friends of the cause can assist in the good work by passing the word along to others and by sending to the Managing Editor the names of those who should be interested in such a journal.

The Constituency of the Monthly should include:

- 1) All teachers of the advanced courses in secondary schools, especially in those schools which offer trigonometry, college algebra, and analytic geometry.
- 2) All teachers of undergraduate courses in mathematics in colleges, universities, and engineering schools.
- 3) University professors of mathematics who wish to keep in touch with pedagogical movements in the collegiate field.
- 4) Graduate students in mathematics who wish to profit by historical and pedagogical discussions among teachers of experience.
- 5) All productive workers in mathematics who may occasionally desire a place of publication for articles of minimum technical difficulty suitable for the promotion of scientific interest among the average mathematical readers.
- 6) All who are interested in the proposal and solution of problems, especially those who seek assistance from co-workers with respect to actual difficulties encountered in the prosecution of research.
- 7) All public libraries and the libraries of all colleges, normal schools, and the larger high schools.